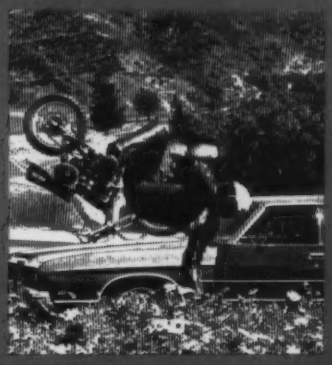
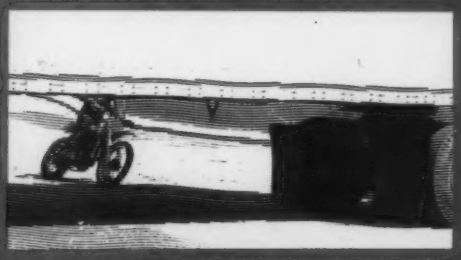
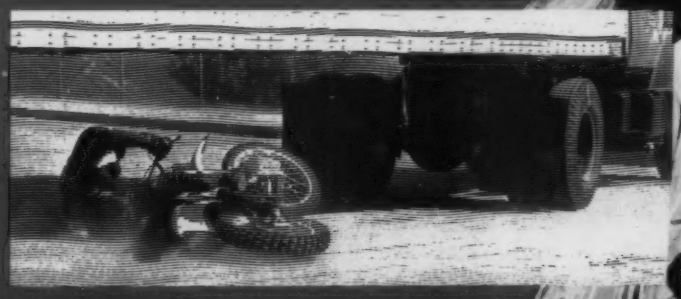
DRIVER

DECEMBER 1983

TESTING!!







If you
EVER NEED IT
will it?

DRIVER

Helmet Testing

Modifications to the helmet weaken the shell and make it vulnerable to cracking. This helmet had a hook-up for a radio installed. When the crash came, the helmet cracked at that point. The rider was in a coma.

A look at motorcycle helmet construction and destruction with Professor Harry Hurt

To get a little information on the construction and testing of motorcycle helmets, we recently visited Professor Harry Hurt. Hurt is head of a nationally recognized head protection laboratory at the University of Southern California. He has 30 years' experience in the study of helmets and motorcycle accident investigation. At USC, he divides his time equally between research in head protection and teaching accident investigation and safety courses.

Much of the work in the lab, of course, centers around motorcycle helmets. Helmets are tested for effectiveness in guarding against penetration and protecting the head in crashes, and chin straps are tested for their ability to hold the helmet on the wearer.

Hurt and his staff also do studies that are commissioned by various government groups and manufacturers of motorcycles and helmets. For instance, Yamaha gave them $25,000 to study the protective properties of crash bars.

They also reconstruct motorcycle accidents, using reports and photographs as well as results of autopsies. In Los Angeles County there are about 250 motorcycle accident fatalities each year; of these, Hurt and his staff get reports on about one half. They have been working since 1978 on these reports and have compiled about 400 of the 625 they have on hand. These, along with about 2000 studies of non-fatal accidents, are being developed into a data bank of motorcycle accident causes and countermeasures. The idea is to make the information available to those interested, in the hope it will promote more emphasis on safe riding.

An interesting fact Hurt and his staff have discovered from the reports is that only one out of eight motorcycle accident fatalities in the L.A. coroner's office was wearing a helmet.

"In our accident research" said Hurt, "one of the main things we've found is that people don't use helmets because 1) they don't expect to be in an accident, and

continued

THE TRAFFIC SAFETY MAGAZINE FOR THE MILITARY DRIVER

DRIVER

DEPARTMENT OF THE AIR FORCE
HQ AIR FORCE INSPECTION
AND SAFETY CENTER
Norton Air Force Base, California
92409

AFRP 127-1 VOLUME 17 NUMBER 7
DECEMBER 1983
CONTENTS

The Backyard Mechanic 22
Cover Story 1
Double Clutch 3
A Great Gift 6
Fire Away 8
Tooloose LeWreck 14
True Accidents 16
"Quick Clear" 19
HLDI Study 20
Backfire 28

What Is Eye Protection 12

Entered as a publication at the Second-Class rate (USPS No. 586-430) at San Bernardino Postal Service, 1331 South E Street, San Bernardino, CA 92403.
SUBSCRIPTION — DRIVER is published monthly and is available for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Back issues are not available. Changes in subscription mailings should be sent to the above address. Use of funds for printing this publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. No. payment can be made for manuscripts submitted for publication. Contributions are welcome, as are comments and criticism. Address all correspondence to the Editor, DRIVER Magazine, HQ AFISC/SEDD, Norton AFB, CA 92409.
Distribution: One copy for every 9 members of USAF.
ATTENTION DEPT OF THE NAVY PERSONNEL: Address all queries concerning distribution to NAVSAFECEN, NAS NORFOLK, VA 23511, Attn: Safety Publications Dept. All other correspondence will be welcomed by the Editor.
The purpose of this magazine is the prevention of vehicle accidents, and the contents are not directive unless so stated. Address reprint requests, stating intended use of material, to the Editor. The Editor reserves the right to make any editorial changes in manuscripts which will improve the material without altering the intended meaning.
The inclusion of names of any specific commercial product, commodity, or service in this publication is for information purposes only and does not imply endorsement by the Air Force.
Certain individuals shown in this magazine are not members of the Air Force and therefore do not conform to Air Force grooming standards.

Hon VERNE ORR
Secretary of the Air Force

Gen CHARLES A. GABRIEL
Chief of Staff, USAF

Lt Gen ROBERT W. BAZLEY
The Inspector General, USAF

Maj Gen GERALD D. LARSON
Commander
Air Force Inspection
and Safety Center

Brig Gen GORDON E. WILLIAMS
Director
Aerospace Safety

PUBLISHED MONTHLY
IN COOPERATION
WITH THE
DEPARTMENT OF THE ARMY
AND THE
DEPARTMENT OF THE NAVY

Dr. FRANCIS S. McGLADE
Director of Safety
United States Army

COMO JERRY C. BREAST
Commander
Naval Safety Center

Col WARREN L. BUSCH
Chief,
Safety Education Division

VIRGINIA HENDRIX
Editor

TSgt RON LATHROP
Technical Editor

JERI ROOD
Feature Editor

CINDY LIGHTHILL
Editorial Assistant

DON KELLEHER
Art Director

ROBERT KING
Staff Photographer

THE EDITOR SPEAKS

DOUBLE CLUTCH

OUR READERSHIP SURVEY

Thanks to the many readers who filled out and returned the readership survey cards from the July issue. We received more responses this year than ever before and we sincerely appreciate the trouble you took.

In analyzing the cards, we learned that the average reader sees a little more than nine issues a year and reads about two-thirds of each. (People over 26 see more issues and read slightly more of each, facts we attribute to older readers being more likely to have desks and IN baskets and regular mail distribution.)

Respondents said they wear safety belts 8.66 times out of 10 and helmets 9.49 times out of 10. This is remarkable because the national average for seat belt wear is only slightly more than one in 10 while helmets are about five in 10. Does this mean Air Force people (the only ones we are able to survey) really buckle up and strap on at a substantially higher rate than other Americans? Or does it mean our cards are likely to be filled out by people who are already more safety conscious than their contemporaries? We suspect the answer to both questions is yes, but . . .

Next survey card, we may amend the questions about using safety equipment to read "when not required by law or regulation."

helmet testing

continued

Two common design components in some helmets — a cutaway at the back and a high attachment point for the chinstrap — make a helmet more likely to fly off in an accident. This "shortie" helmet, a type often used by law enforcement motorcyclists, is especially prone to coming off.

2) helmets, to them, are in some way uncomfortable or inconvenient."

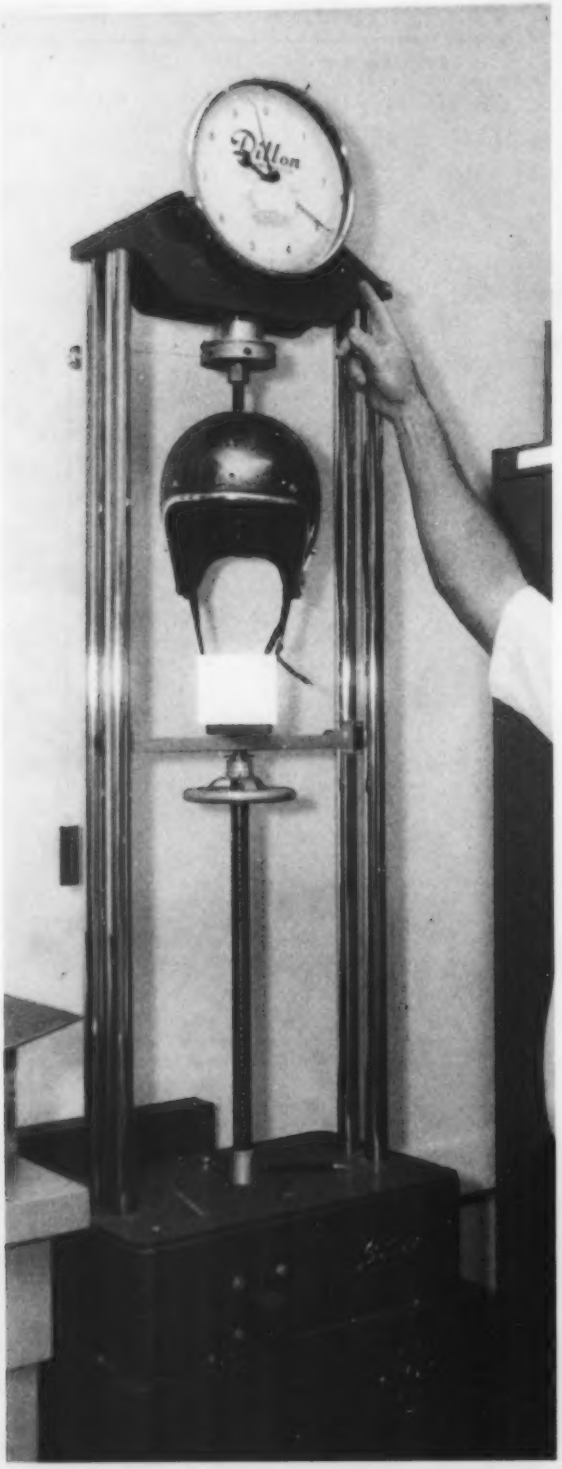
To get a better idea of this problem, they give helmets to motorcycle riders on the USC campus, who then give them a subjective evaluation of the helmets' comfort, design and features. "We then compare the helmets and their use characteristics with their accident characteristics," said Hurt.

To test these "accident characteristics," Hurt uses devices in the lab that slam helmets into hard objects that approximate the surfaces motorcyclists hit when they crash on their bikes. Helmets are attached to magnesium head forms and then dropped along guide wires or rails onto the impact surfaces, called "anvils." Different anvils are used for different surfaces, from asphalt to pipe to a metal edge. The height from which the helmets are dropped determines the G-force of the impact.

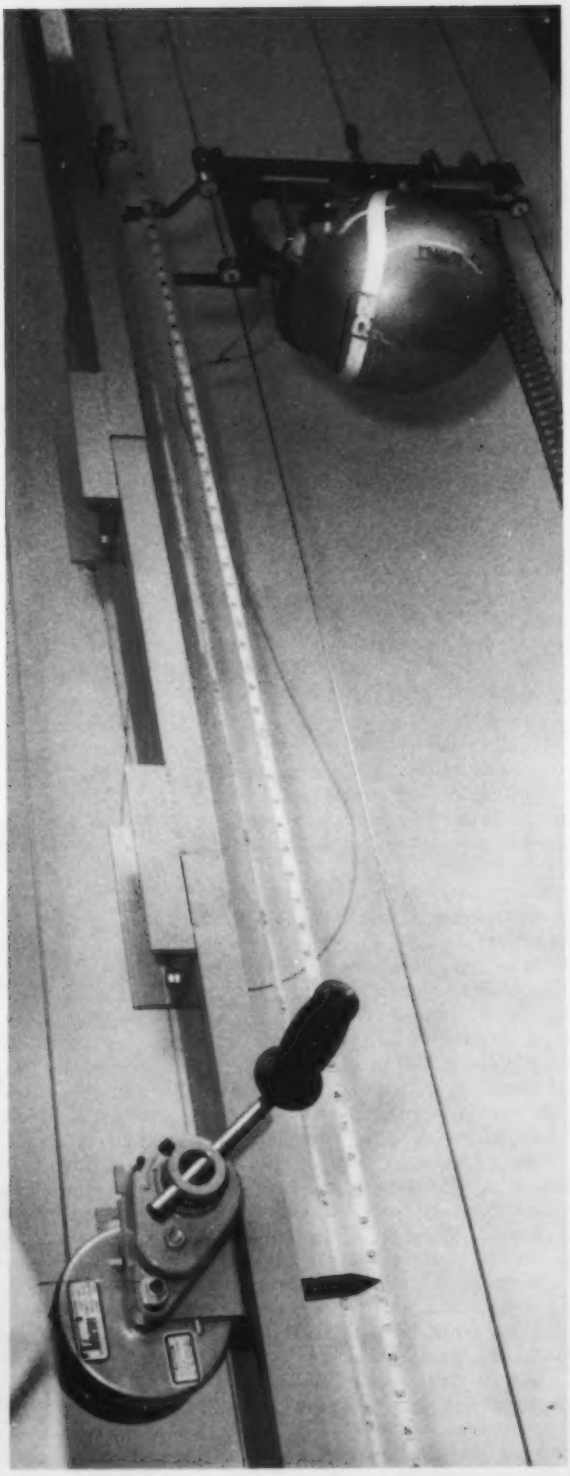
One system, the "single rail" system, is the tougher. The headform is firmly attached to the rail and this doesn't allow the headform to move at all. The two-wire apparatus involves a horizontal bar that slides down two wires. The headform is attached to the bar, which allows movement of the headform and is therefore perhaps a more "realistic" test.

In either case, the form is raised to a predetermined height and dropped. An

continued



This device in the lab is used to test the retention system of the helmet. The machine pulls on the helmet strap, in this case to a force of 300 pounds, and if the strap stretches more than an inch, it fails.



Impact testing is done on an apparatus that drops a helmet with an instrumented headform inside onto an "anvil," which approximates surfaces a motorcyclist might impact in an accident. Hurt raised this helmet to a height of 10 feet on the two-wire system, which allows some movement of the headform.

continued

accelerometer, an electronic device used to measure impact forces, inside the headform sends a signal to an osciloscope which records the G-force.

It is in these tests the real quality of helmets shows up. Hurt said, "There are only just a few that are really premium helmets. Sometimes when you buy by price or label you get nothing but a plastic cookie cutter."

A "premium helmet" would be one of the type designed by Dr. Charles Lombard at USC in the early 1950's — "the hard shell which distributes the force and prevents penetration and the energy-absorbing liner which is styrofoam that crushes and absorbs the impact," said Hurt.

The styrofoam used in helmet liners is much denser than the type commonly used in coffee cups. It compresses to take the shock of impact in an accident, and it stays compressed. Since the styrofoam is somewhat crushed at the point of impact, no matter what the shell of the helmet looks like it will not be able to adequately absorb another impact at that point.

Hurt displayed this by dropping the same helmet twice on the same spot. The G-forces — as shown on the osciloscope — were much higher on the second drop, too high for any human head.

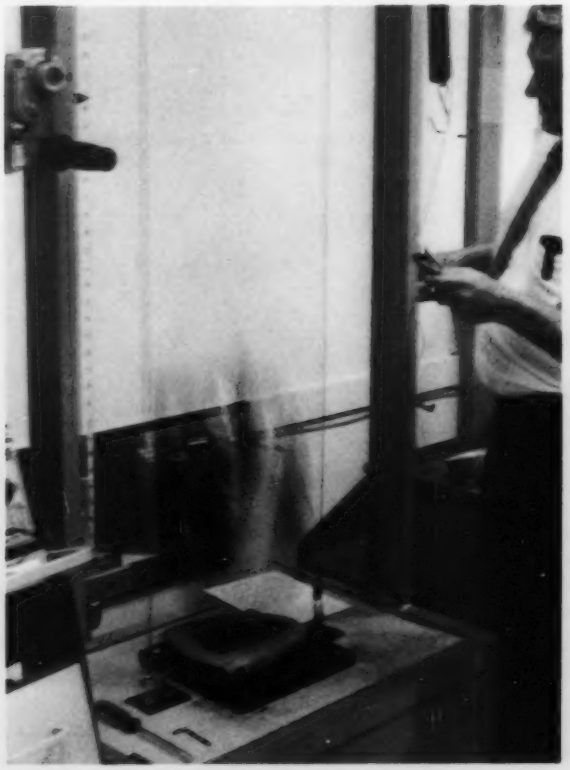
Unfortunately, there are still helmets on the market — though without DOT-approved stickers — with only foam rubber or polypropylene linings. Hurt warned against this kind of helmet.

"Polypropylene is not energy-absorbent," he said. "You can crush it and it springs right back. The styrofoam is almost two and a half times thicker — when you crush it, it takes a lot of force and it stays crushed. If you have foam rubber padding, it makes it comfortable, but it doesn't absorb any shock. It just sops up the flow of blood."

Another concern of Hurt's is the construction of the chin pieces of full-face coverage helmets. Hurt is alarmed that some of these helmets cannot take an impact at the chin piece. They break off and become what he calls "cookie cutters," causing broken jaws and severe facial injuries.

Some helmets have the styrofoam lining, but it stops before it gets to the chin piece, leaving only foam rubber lining — or none — at this point. A good full-coverage helmet will have the styrofoam liner throughout.

"If he looks for that DOT sticker, the buyer can be pretty much assured of getting good quality head protection," Hurt said.



The helmet hit the anvil, an actual piece of asphalt, and bounced once. The G-force, as shown on the osciloscope, was over 250, though of course it only lasted a fraction of a second. Hurt said the helmet was definitely a "premium helmet."

At the impact point, the styrofoam helmet liner is crushed to such an extent that it would not be able to protect against a shock at the same point. Although the helmet shell showed little damage, the wearer would have to replace the helmet.

a GREAT GIFT

Helmets are available in a variety of styles.

Do you have a motorcycle rider on your Christmas shopping list? Why not buy him or her a new helmet? You can buy a good quality helmet starting at about $50, or you can pay over $300 for the super best. Of course, there are many, many quality buys in between the two extremes.

Don't worry if the rider already has a helmet; the odds are it's more than three years old and should be replaced. According to helmet manufacturers, a helmet is structurally sound for about five years. Since you never know how long it was in a warehouse or sitting on the dealer's shelf, it's a good idea to replace it every three years.

Additionally, helmets are one-time use items. One accident and they are wasted, regardless of how good they appear. In fact, if a helmet is dropped it's probably had its life expended.

Most reputable manufacturers will check a "tested" helmet for possible shell damage, compression of the non-resilient foam liner, chin strap damage, as well as damage to the chin strap mountings and "D" rings if you ship it to them after an accident. They'll even send you written damage report with a price quotation for any needed repairs and await your approval. Usually they don't charge for reassembling. But, in the meantime, the rider has had to wear another helmet anyway.

Helmets are bought just as if they were hats. If you know the exact size helmet somebody wears in a certain brand and style, you can save some money by purchasing another one through mail order. However, if he or she is a first-time wearer, or you're buying a different brand or style, it's better to "try before you buy."

This may make gift giving a little difficult, but then that's what gift certificates are for. You could even put the certificate or a check marked specifically for the new helmet purchase inside a helmet box.

When trying before buying, the first requirement is that the helmet fit. It

continued

In order to be used on the street, helmets must have this Department of Transportation (DOT) label.

Quality helmets come in actual hat sizes rather than L, M or S.

(right, top)
Spread the shell with your thumbs inside the chin strap attaching points and slip it on.

(right, middle)
If the helmet moves enough to interfere with your vision when you shake your head, it's too big.

(right, bottom)
Grasp the back of the helmet from the back and try to pull it off. If it comes off, it's too large.

Double "D" rings are the only acceptable fasteners for the straps.

should be snug but not too tight. If the helmet is too tight it will begin to hurt and feel very uncomfortable within a very short time after setting out on a ride. A helmet that is too loose can move about and block vision at critical periods. A loose helmet can also come off when it's needed the most — during an accident — even when fastened.

To put a helmet on, grasp it with both hands, placing the thumbs inside where the chin straps attach to the shell, spread the shell enough to clear the ears, and slip it on. If you're putting on a full-coverage helmet, you should remove eye glasses first, then put them back on after the helmet is on.

With the helmet in place but the strap undone, shake your head from side to side and up and down. The helmet should move a little, but not enough to interfere with vision. Now fasten the strap under the chin as tight as comfort will allow. The opening formed by the strap and the rear of the helmet must be as small as possible to avoid having the helmet come off during an accident. Grab the back of the helmet firmly and try to pull it off. If it comes off, it probably would during an accident too. Look for a better buy.

A note of caution for women with a lot of hair. Don't try to put it all under the helmet. If you do, the helmet will probably not fit correctly and will move around or off during emergency situations.

Be sure the helmet has a double "D" ring fastener, not snaps. The double "D" ring is much better for adjusting fit and keeping helmets on heads.

It is better to buy helmets that are hat sizes rather than those that are marked only Large, Medium or Small.

The L, M and S helmets use the same size shell for sizes, varying only the inner liner and padding to achieve the different sizes.

The difference between open-face and full-coverage helmets is a personal choice. Of course, any rider who has ever taken a fall and landed on his or her face will know what full-coverage is worth in terms of the nose, teeth, chin and jaw. Also, those people who have done a lot of long-distance or cross-country riding know that no matter how accustomed you are to being out-of-doors, the wind and sun will blister, burn and dry riders without full-coverage helmets.

Don't buy a used helmet. You have no idea what it's been through. It could be totally unused but still be of questionable protection because of age, or the number of times it's been dropped, or a hard life of bangs and thumps from hanging on a hook.

Remember, helmets are designed to reduce head injuries in case of an accidental impact. They do this by absorbing energy through deformation of their materials and, in some cases, progressive destructive of the helmet. Dropping a helmet could be all the impact needed to use up its one life. If you drop your helmet, wear an "unused" one until you can get your first-line defense checked out completely.

Think of it as an additional insurance policy.

FIRE AWAY

You could refer to a fire extinguisher as a cheap insurance policy for your car. Like all insurance, you don't want to have to use it, but it's a good thing to have "just in case."

The National Fire Protection Association reports an estimated 443,000 vehicle fires in 1982. (This includes trains, boats and planes as well as autos.) More grimly, the Insurance Information Institute says there were 575 civilian fire deaths in highway vehicles in 1982, and 3,250 fire injuries.

That may not sound like a very great risk. But, as they say, fire is not something to play with. It's something to take very seriously. And since there is so much that is flammable in the car — from the gas and oil to the floor mats — a small fire extinguisher for your car is something you should also think seriously about.

We're not going to tell you specifically what to buy because we don't know what your particular needs are. But, in general, this kind of fire protection could help save your car, or even a life.

An inexpensive extinguisher can provide a little extra insurance in addition to your automobile insurance policy — remember the latter is good only *after* a fire has destroyed the car. You can minimize or eliminate a big repair bill by using a fire extinguisher.

They really aren't that expensive. A good unit can be purchased for under $20 — cheap insurance by any standards. But even if that doesn't impress you, think of it this way: Expense is relative. Weigh the cost of one of these little fire-snuffers against the cost of your stereo tape player or your CB radio, or just against the cost of your car itself and its brand-new paint job. Taken that way, it begins to look better, and cheaper. Or you may have special needs. Take as an example those of you who have jacked up the rear ends of your cars. We don't mean to single you guys out as bad guys (although we wish you wouldn't do it) — it's just that this is one way to increase the fire risk in a car. In the event of the most common type of accident, the rear-end collision, jacking up the rear exposes the gas tank to more damage — and gas burns, you know. Obviously, DRIVER doesn't recommend this kind of alteration to the car's suspension. But sweethearts that we are, we just want to keep you around to read us.

"Okay, okay!" you say. "You've convinced me. I'll go get one."

But wait a minute. There are a few things you should know about them before you go and drop some hard-earned cash for one. There are different types and sizes of extinguishers, and they're pretty easy to remember. Again, we won't tell you specifically what to get — we're just providing a little information.

If you haven't thought about them, you won't know how to go about looking for one. (All fire extinguisher experts can go look at "Backfire" or something. The rest of you, follow along.)

Learn your A-B-Cs: Basically, there are three types of fire extinguishers you should be familiar with. These correspond to the three types of fires you could have to fight.

Class A — This is for ordinary combustibles, like paper, cloth, wood, upholstery, and things like that. The letter "A" will be in a triangle, which, if colored, will be green. This type of extinguisher will be water or loaded-stream (potassium acetate in a non-freezing water solution), or possibly a multi-purpose dry chemical, or Halon 1211, that could be used on the other types of fires.

Class B — This is for flammable liquids, like gasoline, oil, grease or fat. The letter "B" will be in a square, possibly colored red. The extinguisher will contain a dry chemical agent, carbon dioxide, or loaded-stream.

continued

Fire extinguishers come in different sizes, and a small one will be sufficient for installation in your car.

Jacked-up rear ends may make the car look faster, but they also increase the risk of fire if the exposed gas tank is damaged in an accident.

The extinguisher's pressure gauge will tell you when it's ready to use. It must read in the safe range, neither too low nor too high. Otherwise, have it serviced.

Make sure the wire on the ring pull pin is intact. This insures the unit has not been tampered with and is ready to go.

Attached by the mounting bracket to the underside of the dashboard, the fire extinguisher is handy for a quick grab, and it's not in the way of passengers.

Class C — This is for electrical equipment. The letter "C" will be in a circle, possibly colored blue. This type of extinguisher will be dry chemical or carbon dioxide.

There is a fourth class, **Class D,** for combustible metals like magnesium or titanium. The "D" on the container will be in a yellow star. The agent will most often be a dry powder in a pail or drum and is shoveled on the fire. Unless you have true mag wheels, you won't need to worry about Class D fires in your car, but Class A, B and C fires can all occur.

You must be aware of the type of fire you are fighting. The wrong kind of extinguishing agent can actually *spread* a fire. For instance, using a water extinguisher on a gas or oil blaze could be extremely dangerous.

The most common type of extinguisher you'll find for sale will be good on more than one class of fire. Some will have the B-C designation, and some will be A-B-C models. The B-C types will be sodium bicarbonate, potassium bicarbonate or potassium chloride. The A-B-C ones will be ammonium phosphate or Halon 1211.

There's a nifty advantage to the A-B-C models — if you're not sure whether electrical wiring is involved, you're covered.

If you have some extra bucks to spend on a fire extinguisher you may want to look into a different fire-fighting agent known as Halon 1211. Halon 1211 is a methane-family gas that leaves no residue after use. (The other types, except for carbon dioxide, will.) Halon 1211 has become popular for use in places where lack of residue is important, such as computer rooms. But at about $30 it's still rather expensive for the average person.

Okay, now it's helpful hints time. When you go into a store looking for a fire extinguisher you will notice a letter-and-number designation on the container. It will say something like 5-A:10-B:C.

What this means is that the fire extinguisher can be used by the average person to cover five square feet of a Class A fire, 10 square feet of a Class B fire, and can also be used on a Class C. Class C fires are not given square footage rating since these are Class A or B fires which also involve electrical equipment.

Make sure whatever extinguisher you buy is listed by either the Underwriter's Laboratories (UL), or the Factory Mutual Engineering Corporation (FM).

Now what about the size and type to buy? Well, that'll depend on your personal vehicle. The Fire Equipment Manufacturers Association (FEMA) recommends you have something of at least the 2¾ to 5 pound capacity in your auto. But we don't want to discourage you from buying a larger model. Also, FEMA says the A-B-C multi-purpose dry chemical cylinders are best for car use. These are reasonable in price — they'll run between eight and 20 dollars.

Another thing: Don't go in for the small aerosol containers or squeeze bottles. These contain too little agent to help in most instances, and they require you to get too close to the flames.

Providing a home: After you've got the extinguisher, where do you keep it? It is best to have it close to you, so it can be grabbed quickly when you need it. The best place for it is in the passenger compartment of the car. That way it's there with you so you can use it on your smoking engine, or spray it where you

(left), If there's a fire in your engine compartment, you should have a fire extinguisher in hand to combat the flames before you open the hood. Otherwise, **(right)** all you can do is slam the hood shut again.

dropped your cigarette and caught the seat on fire.

Most of the extinguishers come with a mounting bracket, which you can use to mount it under the dash on the passenger side of the front seat. It will be immediately available there, and not in the way.

Sometime you may have to use the thing — not a pleasant thought, but the chance of using it is the reason for having it. Extinguishers are very simple to operate and they have instructions for use on the container itself. You should read these now and familiarize yourself with them, if you want to be effective in fighting a fire in your car. You won't have time to read the label when your hood is turning into a potato chip.

In line with this, you should also know the capabilities of the particular extinguisher you own. Like, will it spray for five seconds, 20 or 30? And of course, what kind of fires is it effective against?

Care and feeding: You'll need to maintain the fire extinguisher if you want it to function when you need it, the same as you need to maintain the car itself. Fortunately, maintenance on one of these things is easy and not time-consuming. There will probably be instructions on maintenance with the extinguisher itself, but here are a few items to watch for.

On the other hand, a fire extinguisher can quickly stop your car from becoming a burned-out shell.

Most fire extinguishers have a pressure gauge to insure their effectiveness. Make sure it reads "fully charged" but not overcharged. If the charge is either high or low, have it serviced. Also, there is a weight designated on the instructions label for the extinguisher. Weigh it at least every six months; if it's below the desired weight, have it recharged.

Other things to check: the nozzle opening should be clear, not clogged with some foreign object. Also: There will be a ring pull-pin, like that in a hand grenade, through the handle to prevent accidental discharge. The pin is held in place by a wire. Check this wire seal to make sure it has not been tampered with.

Now about recharging the extinguishers. The cylinders are plainly labeled either rechargeable or non-rechargeable on the container.

The non-rechargeable kind must be disposed of after use. But with proper care, this kind will last about six years if not used.

The rechargeable kind, which is only a little more expensive by the way, will last almost indefinitely. It should be serviced and recharged every six years, even if it appears okay and the pressure indicates it is ready to go.

Take the extinguisher to a company that services them, for recharging and testing. There are listings for these companies under "fire extinguishers" in your yellow pages.

Another thing: After you have used the extinguisher, even if it is only partially emptied, have it recharged immediately. Even partial use could deplete the pressure and leave you with nothing when you most need the thing.

If you dispose of an extinguisher for any reason, *do not* incinerate it. It could explode and injure you.

Now you're a little better prepared to go out and get a fire extinguisher. Be sure to shop around and compare prices. There are good buys to be found if you do.

Make the small investment in a fire extinguisher on the chance it may save your larger investment in your car.

what is EYE PROTECTION?

To ride a motorcycle safely you must be able to see clearly. Specifically, you must protect your eyes against dirt, insects, water and small stones, which can interfere with your vision.

Like most states, the Air Force requires motorcycle riders to wear eye protection. Face shields, goggles and glasses meet the Air Force requirements. Windscreens do not qualify as eye protection according to Air Force regulations.

While windscreens are designed to deflect some of the dirt, bugs, water and small stones over the riders' heads there is a good chance that these same hazards can be bounced off helmets or, worse, directly into eyes. Additionally, windscreens create low-pressure zones directly behind them as they move through the air. These low-pressure areas swirl the air in such a way that a lot of the dirt, insects, water and dust can be pushed into unprotected eyes.

Both face shields and goggles will protect your eyes as well as reduce eye fatigue brought on by squinting. Regular eyeglasses are currently allowed as eye protection only because all glasses manufactured in the United States are impact resistant. However, eyeglasses were never meant to be eye protection on a motorcycle, and either a good face shield or goggles would be a better choice.

Your personal preference for a face shield or goggles will determine which type of eye protection you wear.

Face shields provide protection to the face as well as the eyes and come in a variety of designs. There are non-flip types such as the bubble and competition "comp" shields as well as the flip-up shields like the bubble- and flat-flip.

When using a face shield be sure it is securely fastened to the helmet to prevent its being blown off.

Look for the ANSI or VESC standards label on the top of a shield when purchasing. This tells you that the shield has passed certain impact resistance and penetration tests. Also make sure that any shield you buy is free of scratches which may distort your vision.

Goggles should also be securely fastened over the helmet so that they don't blow off. The face guard should allow air-flow to your face for comfort, easy breathing and to prevent fogging. Most frames utilize a rubber/cotton fiber strap that resists tearing and stretching.

Before buying any goggle or lens, be sure it carries the VESC approval.

Whether you wear a face shield or goggles, the lenses should be clear. Tinted lenses substantially reduce vision at night. To avoid eye fatigue during the day wear sun glasses under your face shield.

Face shields can be cleaned with a mild solution of soap and water.

Goggles can be washed in a sink by hand and hung up to dry.

Basically, there are two materials used to make lenses: Lexan and Butryate. Both have their own qualities.

Lexan, a polycarbonate material, is used to make aircraft windshields and bullet proof shields. It is a soft plastic material that is placed between two hard-coated outer layers of plastic. This provides a scratch-resistant surface which will absorb a severe impact.

Butryate is more brittle than Lexan but also is more scratch resistant. It is not capable of withstanding as severe an impact without cracking as Lexan does.

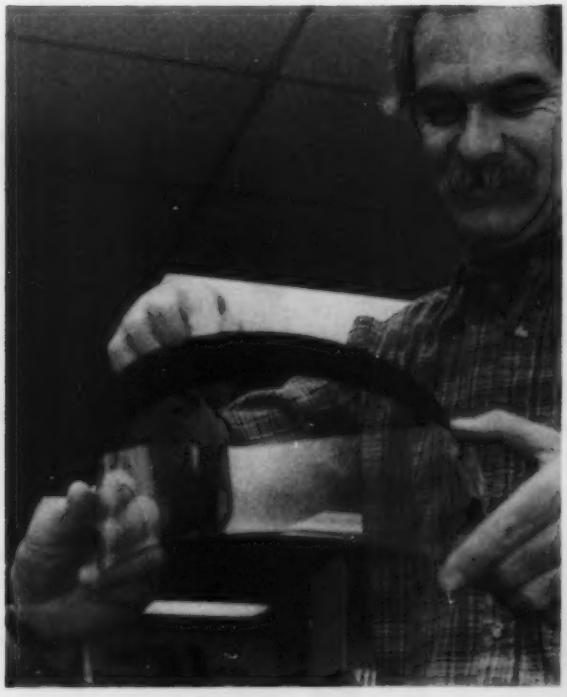
While impact resistance tests vary,

(below)
ANSI or VESC standards labels should be on the top of any shield you purchase.

they usually call for the dropping of a steel ball or projectile onto the face shield or lens. In most cases a face shield will pass the test if it is not fractured, separated or removed from any point of fastening to the headgear. A lens passes if the projectile does not penetrate it. If the lens splits or cracks it still passes as long as it is not punctured.

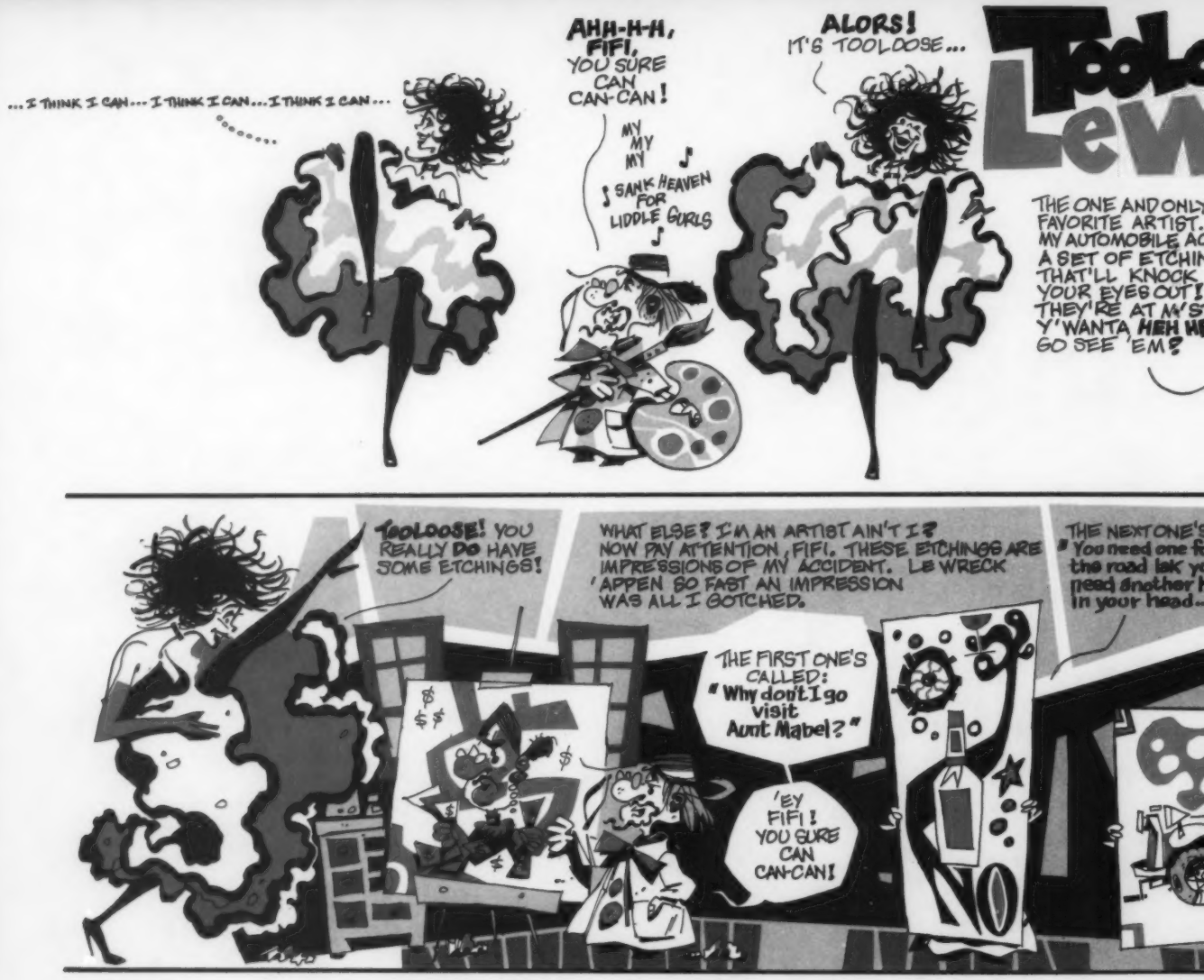
Another test used is the penetration test. A pointed projectile is dropped, needle point down onto the face shield. The shield passes as long as it is not fractured, pierced through, separated or removed from any point of fastening.

(right and below)
Face shields and goggles come in a variety of types and styles providing you a wide range to choose from.



(right)
Lenses on both face shields and goggles should be clear. Tinted lenses substantially reduce night vision.

DRIVER extends a special thanks to the people at Dale's Modern Cycle of San Bernardino, Calif., for their help with the helmet, face shield and goggles stories.


...I THINK I CAN... I THINK I CAN... I THINK I CAN...
AHH-H-H, FIFI, YOU SURE CAN CAN-CAN!
MY MY MY
SANK HEAVEN FOR LIDDLE GURLS
ALORS! IT'S TOOLOOSE...
THE ONE AND ONLY
FAVORITE ARTIST.
MY AUTOMOBILE AC
A SET OF ETCHIN
THAT'LL KNOCK
YOUR EYES OUT!
THEY'RE AT M'S
Y'WANTA HEH H
GO SEE 'EM?
TOOLOOSE! YOU REALLY DO HAVE SOME ETCHINGS!
WHAT ELSE? I'M AN ARTIST AIN'T I? NOW PAY ATTENTION, FIFI. THESE ETCHINGS ARE IMPRESSIONS OF MY ACCIDENT. LE WRECK 'APPEN SO FAST AN IMPRESSION WAS ALL I GOTCHED.
THE NEXT ONE'S
" You need one f
the road lak y
need another
in your head..
THE FIRST ONE'S CALLED: " Why don't I go visit Aunt Mabel?"
'EY FIFI! YOU SURE CAN CAN-CAN!
SCAREY, TOOLOOSE...
OUI. NOW THIS SKINNY ONE'S CALLED: " The fastest turnaround and freeway exit in recent history..."
FIFI, CHERI, 'AVE I EVAIR TELL YOU ZAT YOU SURE CAN CAN-CAN?
THEN, IN ITS PROPER ORDAIR: " With no further mishap I arrive at Aunt Mabel's where ze old bat informs me she has made ze new will. I am cut-off without a centime. She leaves her fortune to LA POSSY CAT!"
FINALLY, MY CAN-
" I leave. I drive a
I run ze red light.
no attention tp z
I think only of za
I am still sitting

LOOSE WRECK!

ONLY, KIDDO! EVERYBODY'S TIST. COMPLETELY RECOVERED FROM E ACCIDENT AND WITH TCHINGS OCK OUT! M' STUDIO... EH HEH HEH... ?

POOR TOOLOOSE! BEFORE YOUR ACCIDENT YOU WERE SIX FOOT-TWO AND LOOK AT YOU NOW... LE RUNT! LE RUNT'S RUNT! YOU LOOK LIKE YOU'RE WALKING ON YOUR KNEES...

IT WAS LE ACCIDENT, CHERI. THE PRICE ONE PAYS WHEN ONE IS INVOLVED IN A RIP-SNORTIN' CAR WRECK AND ONE AIN'T MADE IT CLICK...

AHA! LE STUDIO... LES ETCHINGS... LE HEH HEH HEH

'ALLO DAVE-DOA

'ALLO GÜNTHER

MONTMARTRE MEAT MARKET AND Macaroni Merchants

LE TURPO

ONE'S: one for ak you her hole ead..."

THEN: "I climb into le car zat needs le brake job, new tires, le transmission overhaul, la new headlight... and I sit down on toppa LE SEAT BELT!"

C'EST VOUS TOOLOOSE!

THAT'S ME ALRIGHT! AND THIS IS ME TOO. I CALL IT: "Onto the off ramp and drivin' south in le northbound lane."

ÇAN-CAN CANTOOSIE: ve away. I am shattained. ght. I drive too fast. I pay tp ze task of drivil. I! f zat lousy pussy cat! ing on toppa le seat belt...

"... I drive off ze road. I hit ze tree. I sail through ze windshield and into ze hospital. I suffair from my injuries. Le pain! Le OUCH! How I hate zat rotten pussy cat."

AND FROM THAT DAY TO THIS I AM ON MY KNEES - WHICH IS THE PROPAIR POSITION FOR PRAYER - PRAYING ZAT I BECOME A MORE ATTENTIVE DRIVER ... ZAT I NEVAIR AGAIN FAIL TO MAKE ZAT SEAT BELT CLICK AND ZAT ZAT LOUSY PUSSY CAT MEETS JAWS, MY GREAT WHITE GOLDFISH...

!?

AH-H-H-H FIFI! YOU SURE CAN CAN-CAN!

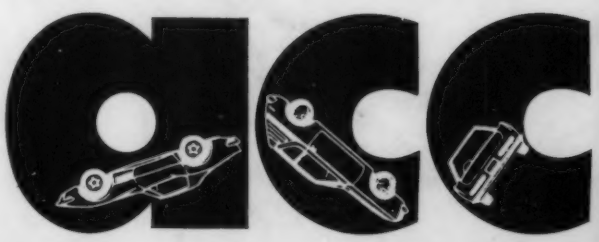
KAUFER

true

A reader's survey card included in the Air Force copies of July's DRIVER brought in many responses that asked for true accident stories. While all the incidents and accidents we talk about in these pages are true, we sometimes speculate on what the drivers might have been thinking or *not* thinking that contributed to the accident. Nevertheless, so many of you asked for true accidents that we are presenting some here without elaboration. We have removed references to specific places, dates and names.

Bus/motorcycle accident
The street was a well-traveled roadway made of bituminous concrete. There were three northbound lanes plus two lanes leading right from the street to the highway ramp. The weather was cloudy. The roads were dry. The collision occurred a short time after sunset. Vehicle 2, a transit bus was northbound on the street in the N-4 lane (the left lane of the two connecting to the highway). Vehicle 1, a motorcycle, was in the right, N-5, lane of the street taking the off-ramp to the highway. As vehicle 2 and Vehicle 1 entered the off-ramp, the motorcycle (1) was behind the bus (2). As vehicle 2 and vehicle 1 entered the off-ramp, vehicle 2 (bus) began to drift to the right, directly into the path of the cycle. The motorcycle operator attempted evasive action by braking, leaving a pre-impact skid mark measuring 28 feet 7 inches. The motorcycle impacted the right side of the bus with the left handlebar area. Both vehicles remained in contact for a short time. The initial collision caused the motorcycle to strike the right curb of the off-ramp. The rider was ejected from the motorcycle and his head was caught under the right rear dual of the bus and crushed between the tire and the pavement. Operator 1 was wearing a helmet. Vehicle 2 (bus) continued along the off-ramp for a short distance until the driver was alerted of the collision and stopped. Operator 1 was transported to the hospital by medivac unit and was pronounced dead by a doctor at 2015 hours. Speed of vehicle 1 at time of collision was 35 mph. Speed of vehicle 2 was 20 mph. Posted speed limit of off-ramp is 45 mph.

Fatigue on hunting trip
Passenger 1 and two non-AF civilians were proceeding on a highway going hunting. Local police stated that it appears operator fell asleep at the wheel and the vehicle went off the right shoulder of the road. The vehicle rolled several times, ejecting passenger 1 who was sitting in the right front seat of the truck. He died of a massive skull fracture. Seatbelts were not used by any of the passengers and alcohol was not involved.



Alcohol and speeding on a motorcycle Operator and passenger were returning to base from downtown. Heading west on a highway at a high rate of speed, operator failed to negotiate a left curve. Vehicle jumped the curb, struck a cement wall and skidded on its side approximately 250 feet. Passenger was ejected when motorcycle jumped the curb. Upon impacting the wall, operator was ejected over the handlebars and impacted the cement wall, shattering the motorcycle helmet into three pieces. Operator was killed and passenger suffered multiple fractures. Operator had consumed at least four beers and four mixed drinks from 1800 hours to 0400 hours. Operator's helmet had a visible crack in it prior to the mishap and the helmet split at the crack. No DOT rating was stamped on the helmet.

Alcohol, pickup and three passengers Operator was driving westbound in a private motor vehicle on a street when he lost control of his four-wheel drive pickup truck, ran off the roadway, swerved to the left, then ran back onto the highway. The pickup left the roadway a second time and rolled over. Occupant number 1 was transported to the hospital where he died of multiple injuries. Occupants 2 and 3 were treated and released. An autopsy was conducted on occupant number 1 by the medical examiner. Result of the BAT (Blood Alcohol Test) was .192. Drug scan: negative.

Alcohol again Members were in a private motor vehicle headed east on a street. A non-USAF tractor with a flatbed trailer pulled out from another street and established a position in the left-hand lane of the street after making a left turn. Operator 1 did not take any evasive action to miss the tractor trailer and drove under the trailer. It has not been determined why operator number 1 failed to slow, stop, or change lanes. Passenger 2, who was in the back seat, stated that the operator saw the rig just prior to impact. Passenger 1 was pronounced dead at the scene of the accident. Results of his BAT was .30, drug scan was positive. Operator number 1 is in critical and guarded condition. Result of his BAT was .227, drug scan was negative. Passenger 2 was treated and released. He was wearing a seatbelt and was in the rear seat.

Alcohol once more Operator number 1 arrived at a park at approximately 1230 hours to attend a picnic. Witnesses observed operator number 1 drinking both whiskey and beer during the afternoon. He was also observed driving his automobile in a reckless fashion (doing donuts) before he left the picnic area. Witnesses described operator number 1 as being drunk. At about 1635, operator number 1 left the picnic area alone in his compact automobile. After traveling about seven miles, his vehicle crossed the center line and collided nearly head-on with a pickup truck occupied by two non-USAF civilians. The road is a two lane, state highway, well marked and maintained, with paved shoulders. It was dry. Road/weather conditions were not factors. Investigation failed to reveal why operator number 1 was slumped over the wheel prior to impact. It is highly likely he dozed off. Operator number 1 was pronounced dead at the scene.

Still more alcohol Operator 1 and passenger 1 left the base at approximately 1330 and traveled to the city on a scenic route. They stopped along the way at a tavern and consumed one beer each. They continued their journey and arrived in the city at approximately 1800.

Between 1800 and 2000 they toured the city and searched for a local map. At 2000 they went to a local restaurant/bar where they ate and consumed two beers with their meal. After they finished eating they went into the bar area where they consumed three to four additional drinks (alcoholic). Just prior to their departure passenger 1 became violently ill. They left the city on the return trip to the base just after 2400. Operator 1 stopped the vehicle because he realized he was too tired to drive and asked passenger 1 if he could assume the driving for the remainder of the trip. The passenger agreed and they switched positions and continued the drive. They were traveling north at 65 mph when the driver fell asleep at the wheel and ran off the road. The vehicle hit an uneven surface which caused it to become airborne. It traveled through the air for 40 to 50 feet before the vehicle landed nose first and tumbled end over end three times. The investigation indicates that both occupants were ejected from the vehicle. Operator 1 received minor

(treat and release) injuries and passenger 1 received fatal injuries when the right side of his head contacted a jagged portion of the roof of the car when he was ejected from the vehicle.

And more alcohol Operator 1 picked up passenger 2 from the airport at approximately 1800. At approximately 1930, operator 1 and passenger 2

continued

went to an off-base bar and drank until approximately 2115. At this time, operator 1 and passenger 2 proceeded to another off base bar and continued drinking until approximately 0200, at which time they both returned to the dorm on base. The next day operator 1 and a few other people sat around drinking and shooting pool for an undetermined amount of time. At approximately 2030, operator 1 and passengers 1, 2 and two other individuals drove to an off base bar and started to consume alcohol. The other two individuals left the bar at approximately 0030. Operator 1 and passengers 1 and 2 remained in the bar and did not leave the bar until approximately 0700. Operator 1, passengers 1 and 2 departed the bar, attempting to return to the base in operator 1's vehicle. While traveling north, approximately two miles from the base, operator 1 drove his vehicle on the right shoulder. He tried to correct the vehicle but overcompensated, thereby causing it to go into a skid and become uncontrollable. Vehicle 1 then crossed the center line, striking vehicle 2 head-on, resulting in reportable injuries to passenger 1, minor injuries to passenger 2, and death of operator 1. BAT results: .21.

Speeding The operator was eastbound on a narrow two-lane asphalt country road that traverses a small hill (30 ft. rise) and has a 45 degree bend to the northeast just beyond the top of the hill. A narrow two-lane gravel road intersects at the bend from the south. The operator sped (estimated 70-80 mph) up the hill and attempted to negotiate the bend. He could not, so he locked up the brakes and left four short skid marks (1 ft. long each) on the edge of the asphalt. The vehicle then entered the gravelled intersection and slid sideways approximately 20 feet, where the right tires struck the edge of the field (a 6" to 8" difference between surface levels). The momentum forced the vehicle into a sideways roll. The centrifugal force threw the operator from the vehicle. He landed 301 feet from the edge of the road. The vehicle stopped 279 feet from the road's edge, and the hood landed 579 feet from the road's edge. The operator died from head and neck injuries shortly thereafter.

Speeding on a motorcycle At approximately 0200 hours, operator, with a non-military friend as passenger, lost control of his motorcycle on an "S" curve on a city street that is speed zoned at 40 mph. He had apparently picked up a friend who was a co-worker at an establishment where the operator was a part-time employee. The motorcycle spilled in the street, slid over a curb, crossed a grassed area and, after striking a curb of an intersecting street, the bike and occupants returned to the center of the original roadway and stopped. The operator was located in the vicinity of the motorcycle, and the passenger was dead at the scene. The operator died on the way to the hospital. The street was dry, and excessive speed is believed to have caused the loss of control. Helmet was worn by the military operator.

Two cars, nine people, alcohol, fatigue and speed Operator number 1, a non-Air Force civilian, was driving north on a highway. Passenger number 1, USAF military, was in the right front seat, probably asleep. Operator number 2, non-Air Force civilian, was driving south on the same highway with six passengers. Vehicle 1 driven by operator number 1 crossed the centerline and struck vehicle 2 head-on. Both vehicles were destroyed and both occupants of vehicle 1 were killed. Operator number 2 received disabling injury. None of the people involved in the mishap were using available restraints. Operator number 1 had worked a full day at a physically demanding job at a steel plant on the day of the mishap. Operator number 1 and passenger number 1 met after work and transported a pleasure boat to a state park. When the two bodies were examined by the county coroner, a stamp was found on the back of both right hands. This stamp was traced to a club that serves alcoholic beverages to persons age 19 and over. When vehicle 1 struck vehicle 2 it was four feet over the center line. Since passenger number 1 died of massive facial and head injuries from striking the dashboard, it is believed that the use of available lap/shoulder harness might have saved his life. Based on available evidence, it is believed that mishap was caused by a combination of alcohol, fatigue and speed.

One car, four occupants, one fatal At approximately 2330 hours, operator 1, passengers 1, 2 and 3 were sitting outside their barracks when they collectively decided to go to the city. Operator 1 had just finished working an eight hour shift at 2200 hours. They left the barracks and went to the city. At 0430 hours they started to return to the base. On the way back operator 1 stopped at a gas station to ask for directions back to the base. Vehicle 1 was traveling in a northerly direction at a high rate of speed. Vehicle 1 drifted across the centerline and continued into the oncoming traffic lane before striking a utility pole. Vehicle 1 severed the pole and continued traveling approximately 100 feet in the air before striking the ground. Vehicle 1 then flipped over once and operator 1 and passenger 1 were thrown free of vehicle 1. Passenger 2 and 3 were trapped in the back seat of vehicle 1. When vehicle 1 rolled to its upright position, operator 1 was pinned underneath it. Operator 1 was pulled from underneath vehicle 1. At that time approximately 4 grams of marijuana was found on the person of operator 1. All four occupants were transported to the hospital. Seatbelts were not worn by any of the occupants of vehicle 1. Operator 1 died. Passengers 1, 2 and 3 suffered multiple injuries. Investigation revealed that operator 1 had taken a six-pack of beer with him to the city.

One person on a motorcycle Member was traveling on a road approximately 10 miles north of the base. As the driver of a motorcycle, he collided with a street lamp post while negotiating a curve of the road. Time of the incident was approximately 0250 hours. Death was apparently instantaneous.

Motorcycle, high speed The member left a bar at approximately 0100 hours on a motorcycle and proceeded west on a highway for approximately one and one half miles. Member was traveling at a high rate of speed when he collided with the rear-end of a pickup truck traveling in the same direction at approximately 0110 hours. The coroner pronounced the member dead at the scene at approximately 0145 hours. The accident was witnessed by another member who was riding another motorcycle with the member.

"QUICK CLEAR"

Within a minute the ice surface of the frozen windshield in the top photo is melting (middle photo) and within three minutes the windshield is completely clear (bottom photo), all without prior engine warm up.

Vision is a very important part of driving. During the winter, however, the driver's ability to see is often hampered by ice, frost and fog on the windshield.

In the past the only solution was to wait for the slow action of the blower and the engine heat to clear the windshield. And because of the slowness, many drivers attempt to move through traffic with patchy appearing windshields. Recently there has been the addition of wires or lines through the glass, but this is too distracting for windshields and is used in rear windows only.

Now comes a new heated windshield from Donnelly Mirrors, Inc., called "Quick Clear." "Quick Clear" heated glass is a laminated windshield with a transparent coating that can be electrically heated, providing uniform and rapid defrosting or de-icing. The technical breakthrough that made it possible for Donnelly to achieve a high uniformity in the heating of a large area of glass is due to the application of a transparent conductive coating on the glass. Completely sealed and insulated, power is supplied to the windshield with only minor modifications to a vehicle's electrical system.

Of course, rapid and highly uniform clearing of the windshield without engine warmup saves time and enhances driver safety.

The "Quick Clear" heated glass windshield has already won acclaim with the presentation of a 1983 Industrial Research & Development Magazine I-R 100 award. This honor could be called the "Academy Award" of the scientific community. Previous I-R 100 award winners have included the hand-held calculator and instant color photography.

Donnelly Coated Products' Senior Product Engineer Lowell Bitter is credited with the invention, along with the development and support groups of the Applied Research and Technology staffs.

Although Donnelly officials couldn't divulge particular customers' names at press time, they did indicate the vehicle manufacturers' interest is high in the new "Quick Clear" heated windshield. DRIVER will let you know more details about both original equipment and aftermarket applications as they become available.

HLDI STUDY SHOWS U.S. MADE CARS HAVE LOWER INJURY FREQUENCY

U.S.-made autos continue to dominate the list of passenger cars with the lowest injury loss record, a report by the Highway Loss Data Institute (HLDI) shows.

Of the 12 cars with injury claim frequencies that were at least 30 percent better than the average for 1980-82 models, 11 were domestic models and eight of those were built by General Motors, HLDI said. HLDI is an affiliate of the Insurance Institute for Highway Safety. Most of the cars with the lowest injury rate were either large station wagons or large 4-door models. (See table)

In contrast, the cars with the highest injury loss record were mostly small, 2-door models, HLDI said. Seventeen out of the 146 models evaluated had at least one claim frequency result that was more than 30 percent worse than the overall average, and 15 of those were Japanese imports. (See table)

The Volvo 245 station wagon (1981 and 1982 models) also made the top-rated listing, as did the Ford LTD station wagon, 4-door Mercury Marquis, and the American Eagle station wagon.

The Oldsmobile Custom Cruiser, a large station wagon, had the lowest overall relative claim frequency, 44 percent below average, and the lowest frequency of claims for injury costs exceeding $250, which was 48 percent below average.

The 4-door Oldsmobile Delta 88 had the lowest frequency of claims greater

1980-1982 Passenger Cars With the Best Injury Loss Experience
Relative Injury Claim Frequencies — Personal Injury Protection Coverages

Make and Series	Exposure	Relative Claim Frequencies By Size of Claim			
		All	>$250	>$500	>$1,000
Oldsmobile Custom Cruiser	11,005	56	52		
Oldsmobile Ninety-Eight-4 Dr.	35,773	61	73	72	71
Oldsmobile Toronado	24,494	62	69	70	
Buick LeSabre-4 Dr.	35,341	63	62	68	68
Ford LTD-S.W.	11,320	63	71		
Cadillac DeVille-4 Dr.	36,324	63	71	78	88
Oldsmobile Delta 88-4 Dr.	63,058	64	64	64	61
Oldsmobile Cutlass-S.W.	22,347	66	59	58	
Volvo 245-S.W.*	5,409	66			
Mercury Marquis-4 Dr.	21,233	68	68	70	
American Eagle-S.W.	15,228	73	72	69	
Oldsmobile Cutlass-4 Dr.	108,146	75	69	68	67

Of these 12 cars, all are U.S.-manufactured except the Volvo 245 station wagon.

*1981 and 1982 models only

than $1,000, 39 percent below the overall average.

The car with the worst injury loss experience was the 2-door Datsun 210, with overall claim frequency running 51 percent above the average. It also had the highest frequency of claims in every claim size category.

As in previous years, generally as car size decreased, injury claim frequencies increased.

Vans, pickups, and utility vehicles were also analyzed, and as a group they had lower injury results than the average results for passenger cars. Generally, large and intermediate-sized utility vehicles and standard-sized pickups had the best experience, ranging from about half to two-thirds the average for passenger cars.

Small utility vehicles, especially the Jeep CJ-5 and CJ-7 models, continued to have the worst injury experience among vans, pickup trucks, and utility vehicles.

(For copies of the report, "Insurance Losses, Personal Injury Protection Coverages: Passenger Cars, Vans, Pickups, and Utility Vehicles, 1980-1982 Models," (I-82-1) write the Communications Dept., Insurance Institute for Highway Safety, Watergate 600, Washington, D.C., 20037.)

1980-1982 Passenger Cars With the Worst Injury Loss Experience
Relative Injury Claim Frequencies — Personal Injury Protection Coverages

Make and Series	Exposure	Relative Claim Frequencies By Size of Claim			
		All	>$250	>$500	>$1,000
Datsun 210-2 Dr.*	29,875	151	169	174	176
Dodge Challenger	8,849	149			
Toyota Corolla-2 Dr.*	53,534	141	148	144	139
Pontiac T1000-2 Dr.*	7,644	141			
Plymouth Sapporo	8,849	140			
Toyota Corolla Tercel-2 Dr.	78,693	139	134	131	131
Datsun 310-4 Dr.*	7,326	137			
Subaru DL-2 Dr.*	7,475	137			
Datsun 210-4 Dr.*	5,955	136			
Datsun 200 SX	63,387	135	134	140	143
Datsun 310-2 Dr.*	20,869	135	130	130	
Plymouth Champ-2 Dr.	34,859	132	146	142	141
Dodge Omni-2 Dr.	42,744	130	131	134	137
Toyota Celica	124,352	129	132	137	135
Toyota Starlet*	11,883	128	135		
Toyota Corolla-4 Dr.*	20,002	128	134	140	
Honda Prelude	35,736	125	128	134	138

Of these 17 cars, all are Japanese imports except the two-door models of the Dodge Omni and Pontiac T1000.

*1981 and 1982 models only

rear wheel BRAKES on FRONT WHEEL DRIVE CARS

Check both sides of both front wheels since the emergency brake will have to be released to remove the rear drums.

Securely support the rear of the vehicle once it is jacked up.

Remove the rear wheels and mark the drums so that they can be returned to their proper position.

Pry the grease cap loose and remove it. There are special tools to make this job easier.

After pulling the cotter pin (or, in this case, peening out a portion of the collar), remove the hub lock nut.

Being careful to retain the outer wheel bearing, remove the drum. It's important to work on only one brake at a time, since that means you'll always have a fully assembled unit.

Ask most people what the most important safety device on a car is and they'll answer, "Brakes." Without brakes there is no way to effectively stop a vehicle short of an accident.

Although brake failures are very rare with today's dual master cylinder, heavy-duty brake systems, brakes do require some basic care and maintenance to stop surely and safely.

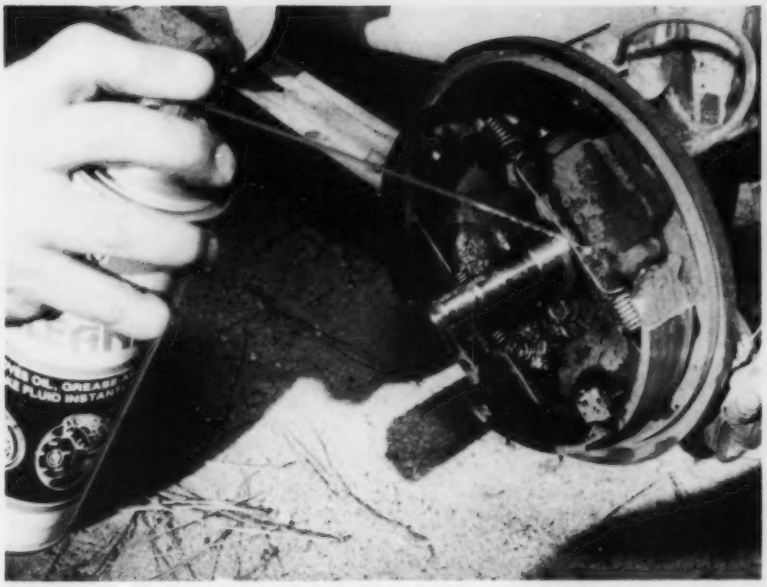
Most front-wheel-drive cars have disc brakes up front because most of the braking action takes place there. However, rear brakes are still required to stop the car in a controlled state. Because they provide less braking action and therefore generate less heat, the more conventional drum-style brakes are found on the rear wheels.

Rear brake shoes normally last about twice as long as front disc pads. Even so, they should be checked for wear at least every 15,000 miles to avoid loss of braking effectiveness.

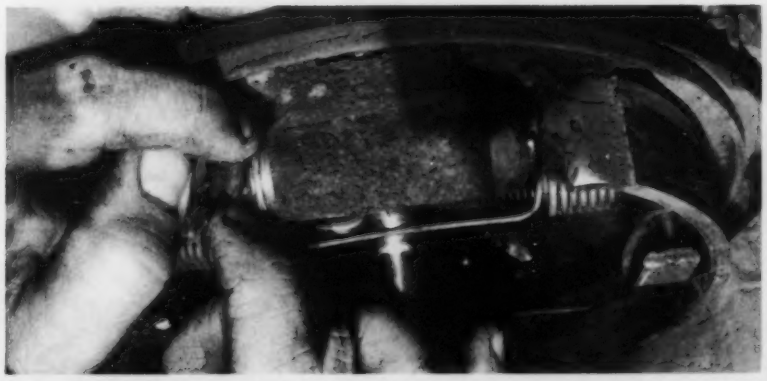
The steps shown here generally apply to all rear brake systems on front-wheel-drive vehicles. However, this job shouldn't be attempted without having a good shop manual for the specific vehicle handy. The shop manual will provide step-by-step instructions and specific details necessary to do the job safely.

Before starting the work, be prepared to do a complete brake job. Don't think that once you get into it you're just going to hop over to a parts store and get what you need. First of all, you'll need back-up transportation since the car being worked on will be without rear wheels. Also, the store may not have the parts you need and have to order them.

Planning is another area where a shop manual for the specific vehicle comes in



(left) Clean the drums, brake parts and backing plate with a commercial cleaner or alcohol. Be very careful not to breathe any of the dust. **(right)** Measure the lining thickness. If it's less than 1/16th-inch the shoes must be replaced. If it's less than 1/8th-inch, it's a good idea to replace them.



(left) Check the shoes for cracking and signs of contamination by oil, grease and brake fluid. **(right)** Carefully pry the cups back and check the wheel cylinders for leakage. If you see signs of fluid, the wheel cylinders will have to be rebuilt.

handy. In addition to helping you decide what parts will be necessary, the manual will tell you if there are any special tools required to complete the job.

You'll also need to locate a machine shop that offers while-you-wait service on turning brake drums. Doing this job at the installation auto hobby shop almost guarantees this, but check first.

Rear wheel drum brakes on today's front-wheel-drive are very similar to the front drums on older, conventional vehicles. The Backyard Mechanic will be servicing the front disc pads on a front-wheel-drive car in an upcoming issue.

(left) To change the shoes, first remove the front (it's called trailing) shoe retaining pin and spring. Usually it's a push-and-turn operation requiring a little finger strength or a good pair of pliers. **(right)** Disengage the lower end of the shoe from its anchor point.

continued

continued

Unhook the lower spring.

(near right)
And remove the shoe.

(far right)
Remove the adjuster anti-rattle spring (right hand).

Disengage the adjuster.

(near right)
Disengage the rear (leading) shoe pin and spring assembly, and remove the rear shoe.

(far right)
Inspect the adjuster for looseness or wear around the quadrant and knurled pin. Also make sure the adjuster is backed off before reassembling the brakes to make the job easier.

Disengage the upper spring. There's a special tool to help with this.

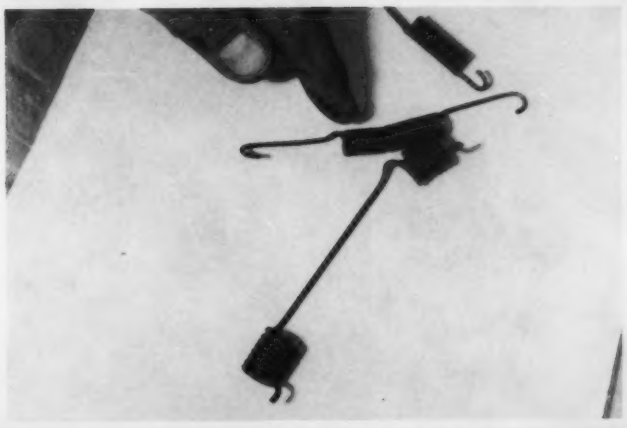
(near right)
Inspect the springs.

(far right)
Inspect the brake drum for cracking, scoring or wear. If when you drag your fingernail over the surface it catches on anything, the drums should be turned. Drum machining requires careful following of limits that are printed in the shop manuals.

(near right)
Lightly lubricate the contact points on the backing plate, adjuster, anchor and wheel cylinder with lithium-base grease.

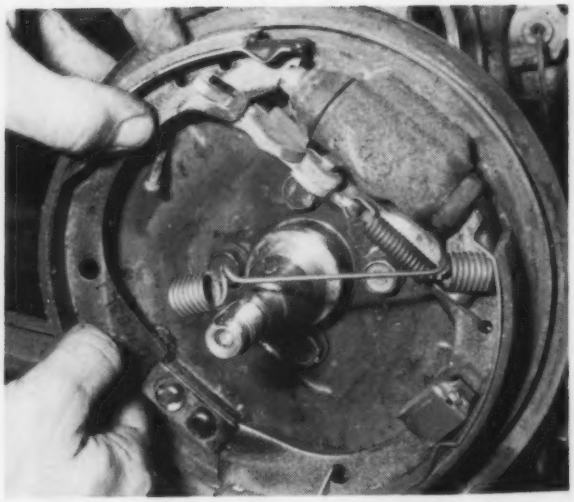
(far right)
Make sure the replacement shoes are the correct ones. In this case, the old shoes (left) had been on the car more than 50,000 miles and outlived four sets of front disc pads.

continued



continued

To reassemble the brakes, reverse the previous steps. First put the rear shoe in place and install the pin and spring.

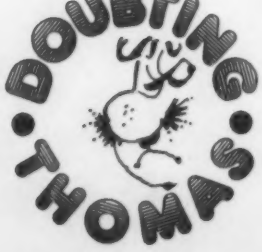


Install the front shoe to the adjuster and anchor points.

That special tool would be real helpful when it comes time to install the upper spring.

Then the lower spring.

And finally the front shoe retaining pin and spring assembly.



There's a great deal of concern about the rear brakes on 1980 General Motors front-wheel-drive X-cars (Buick Skylark, Chevrolet Citation, Oldsmobile Omega and Pontiac Phoenix.) The problem is loss of control when the rear brakes lock. So far, recall solutions have included new brake proportioning valves, finned brake drums and less aggressive brake linings.

Recently, one of our friends decided to test his X-car before he took it in for the recall repairs to see if it really did lock the rear wheels and spin.

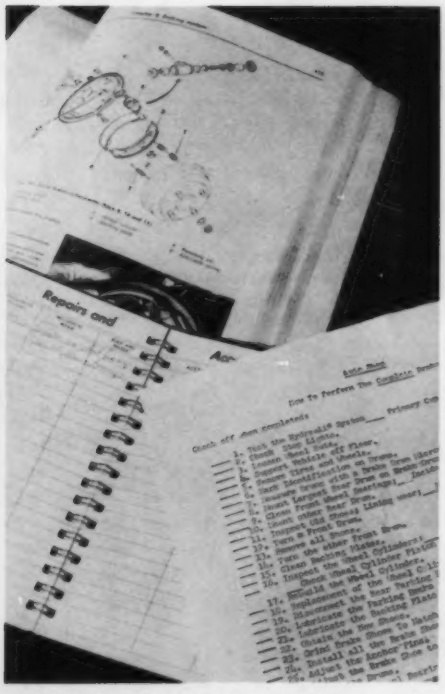
No matter what he did, he couldn't get the rear brakes to lock. When he pulled the rear drums, he found that the brake shoes were worn out. So he replaced them.

When he retested his car, he lost control when the rear brakes locked and caused the car to skid. Fortunately,

(near right)
After checking to make sure that everything is in place, move the shoe assemblies so that the brake drum installs easily and slide the drum on.

(far right)
Install a washer and a *new* hub lock nut. Then follow the shop manual specifications on tightening the wheel bearings (we'll be repacking wheel bearings in next month's Backyard Mechanic) before installing a new cotter pin.

A road test is always a must before pronouncing the job fit.



Of course you'll want to make a record of your work.

only his pride was hurt.

The obvious lesson is don't be a doubting Thomas. If your car is recalled, take it in and get it fixed.

However, in this case there's another message. Many of the companies making replacement parts are manufacturing items to original equipment specifications. In the case of rear brake shoes for 1980-1983 X-cars, the replacement parts are as "aggressive" as those replaced in the recalls.

As a result, the National Highway Traffic Safety Administration's Office of Defects Investigation has asked six independent suppliers of X-car replacement brake linings to withdraw products similar to original equipment from the marketplace. The six companies are: Abex Corp., Bendix Corp., H.K. Porter Co., McGraw-Edison Co., Parker-Hannifin Corp. and Raymark, Inc.

Backfire
LETTERS to the EDITOR

**OF HELP!
IN NEED**

The Maine Air National Guard is interested in the possibility of sponsoring an on-base Driver Rodeo. This project is in the initial planning stages and in need of information.

Would it be possible for DRIVER Magazine to furnish information such as guidelines, course layout, scoring, etc.? Could you also advise which air base or guard unit, if any, has ever held any such event?

I would welcome any information that you could provide.

**1Lt. Thomas Landry, USAF
MeANG, 101st Resources
Management Squadron
Bangor ANGB, ME 04401**

Can any of you readers help Lieutenant Landry?

MANDATORY READING

I wish to complement you on your initiative in printing an article on automobile safety that says something besides "buckle up" ("Driver Errors and How To Avoid Them," Sept. 83). As good as seatbelts are, the prevention of an accident is even better. This is the first article I have seen that provides information on how to avoid accidents. All of the others imply that if you wear your seatbelts your responsibility has been completed. This article should be mandatory reading for everyone who gets behind the wheel of a vehicle. Thanks for a job well started. Let's see more of this kind of information.

**Bruce Williams
Lowry AFB, CO 80230**

**SMACK THEM WITH
A DRAGONFLY!!**

Everyone that is against helmet laws is not necessarily a moron. Some are actually quite intelligent. Maybe if you were to drop your self-righteous attitude and tastefully give your opinion along with the opposing viewpoint more poeple would see the light.

However, you are right in the fact that helmets save lives. That does not necessarily mean it should be a law. A 20 mph speed limit would save an enormous amount of lives but it is just as ridiculous or more so than the helmet laws.

For your information, I do wear a helmet all the time. I consider it foolhardy to ride without one. If you want to convince someone to wear a helmet, smack him in the face with a dragonfly that is doing 60 mph (this will also work with raindrops). Another method would be to swat him on the top of the head with a healthy sized chunk of pavement. If that doesn't convince him, nothing will.

**A1C Bruce A. Robinson, USAF
Tyndall AFB, FL 32403**

FREE TO BE?

After reading SP6 Bradley Scott's letter in the October 1983 "Backfire" I felt compelled to comment on some points Scott made.

After seriously considering his view of "Free Society" and letting "Those Who Ride Decide" (for helmet use), I'll admit he has a perfectly valid point. Helmet use (and seatbelt use in cars) should be a choice left to the individual, and the responsibility for our actions should remain ours also. Therefore, as a motorcyclist in this free society if I should decide not to wear my helmet, my insurance company should be "free" to cancel my insurance at the moment my head contacts the ground if and when I sustain a "get-off" on my bike. Naturally the military should be "free" to consider my mishap not line of duty so that I may be "free" to pay my hospital bill (presuming I survive).

How about it Scott? Since we should be allowed the right to decide don't you think the same should hold true for our insurance companies and the Department of Defense?

Personally I like this idea of freedom of choice. That way my insurance costs will go down because they won't have to worry about paying out for folks like you anymore. So how about it all you anti-helmet riders? Get out there and let your Inspector General and insurance agent know what you want. You'll be doing all us riders a favor in one way or another.

Professionally, my opinion is much different. Your letter indicates you have a very poor attitude towards personal safety, which is evident in admitting to having "your share of accidents both serious and minor in 13 years of riding." I didn't realize riders were allowed to have a fair share of accidents. One mishap is one too many and proves you still have much to learn about riding a motorcycle safely.

To be perfectly frank, DOD directives are still too lax. Along with the helmet and eye protection requirements, the use of leather jackets, boots and gloves should be standard. But DOD has taken the most important step, that of providing quality rider education programs through the use of MRC, Better Biking and MOST II at many military installations,

Address your letters to:
Editor
DRIVER Magazine
AFISC/SEDD
Norton AFB CA 92409

and you'll find these courses are "free" also. I suggest you enroll in one at your earliest opportunity.

William Stark
Beale AFB, CA 95903

THE FALLACY OF POUNDS

As an avid motorcycle enthusiast (10 years plus experience), I enjoy the many fine articles about motorcycles in DRIVER. Some of your articles concerning motorcycle safety, along with other statistics clearly illustrate that the sport is at best risky.

Experienced street riders sooner or later, either by accident or near miss, realize one thing: The only "edge" we bikers have over our four-wheeled counterparts is *maneuverability!* The ability to simply accelerate harder, stop quicker, and turn tighter than that four-wheeler waiting to turn left in front of us at the intersection or change lanes suddenly on the interstate while we're trying to pass.

Therefore, I just take exception to TSgt. Lathrop's (Double Tech, September 1983) statement that ". . . there are cars out there that can stop shorter than motorcycles." *Really?* Check your facts and physics again. It boils down to a simple matter of inertia. The fact is, a 3,200 pound car will require greater stopping distance than even the "super-bikes" (my 1100cc weighs a mere 560 pounds). If I weren't convinced of this I would have hung up my helmet long ago. The fact is we bikers need our "edge" because in the safety arena we can't compete with cars equally.

So produce your facts and statistics (after all, you made the statement originally), otherwise don't let your fallacy outmaneuver your credibility.

Capt. E.F. Slany, USAF
Ellsworth AFB, SD 57701

The real world facts can be found by comparing the stopping distances listed in car magazine road tests versus those in motorcycle magazines. And those facts are: "There are cars out there that can stop shorter than motorcycles."

As for the physics of stopping, you're almost right. A car weighing 3,200 pounds would cover a greater distance in stopping than a 560-pound motorcycle with a 180-pound rider IF all the other factors were equal. Equal size and number of brakes as well as equal size and number of tires.

But these other factors which increase the machine's coefficient of friction aren't equal. They heavily favor stopping the car in a shorter distance.

Tires make the biggest difference in stopping distances. The much wider and greater number of car tires apply their stopping forces to a greater area and, therefore, generate substantially more stopping power.

EXECUTING THEIR MISSION AGAIN

It was 1100 hours March 8, 1983, a Saturday morning. It had snowed six inches the day before. The main roads were cleared of all snow. I proceeded to downtown Cheyenne from F.E. Warren AFB, Wyoming by way of Randall Ave. and East Lincoln Highway to a tailor shop to drop off some clothing. I decided to take I-80 and I-70 back to the base. I headed west bound on I-80. My speedometer was registering a constant 45 mph. Before I was aware of its presence, the mysterious translucent substance had overtaken my vehicle — black ice.

I maneuvered to switch lanes, only to find its presence once again. My vehicle was out of control! I struggled to regain control but the car traveled in an irregular, self-guided path, switching lanes four times for a quarter of a mile. With each change of direction, the centrifugal force and momentum shifted my body. I felt the seat and harness restraints grasping my waist and upper body — executing their mission of keeping the body parts stationary in the seat.

Moments later the vehicle journeyed onto the median and down a declining bank. I felt my body wanting to slip out of the seat and finally it rose about an inch from the seat as the vehicle impacted the guardrail.

Those few seconds seemed like minutes but it was all over and my vehicle came to an abrupt, $2,000-damaged stop. The most important outcome was that I was without a scratch.

The bottom line is that restraints not only save lives but also prevent serious injuries. They secure you to the seat, thus keeping you stationary as you try to regain control of your out-of-control vehicle. Moreover, they also keep you from kissing the windshield upon impact.

1Lt Robert F. Young, USAF
F.E. Warren AFB, WY 82005

☆U.S. GOVERNMENT PRINTING OFFICE: 1984 783—029/2

This emblem was developed by Air Force Communications Command for use as a sticker for bumpers, bulletin boards, etc. Available throughout AFCC, the words apply equally to all major commands and separate operating agencies as well as all uniformed services and civilians. Alcohol is still the number 1 cause of our private vehicle accidents.